MAKING YOUR WORLD COOLER®

HYDROCARBON

ENERGY EFFICIENCY • PERFORMANCE • SAVINGS

SERVICE MANUAL

R-290

natural refrigerant®

INDEX

Why R-290 1

Best Alternative 2-3

FAQ 4-6

Labeling 7-10

The Difference in R-290 vs. R-134a/R-404A 11-16

What's the Difference in Servicing 17-24

What's the Difference in Tools 25-29

R-290 Tools 30-31

Contact Info. 32

Why HYDROCARBON Refrigerant

Reason #1: The EPA has mandated a ban on HFC Refrigerants R-134a and R-404A by 2020

-Stand-Alone Medium Temperature Commercial Refrigerators Beginning in 2019
-Stand-Alone Low Temperature Commercial Freezers Beginning in 2020

Reason #2: Significant New Alternative Policy SNAP approval from EPA -December 2011

natural refrigerant

WHAT IS THE BEST ALTERNATIVE?

R-290

WHY IS R-290 THE BEST ALTERNATIVE?

- **NATURAL, NON-TOXIC, NON-OZONE DEPLETING AND LOW GLOBAL WARMING POTENTIAL**
- **BETTER THERMODYNAMIC EFFECIENCIES**
  More energy efficient / lower carbon footprint / less electrical operating cost
- **MATERIAL PROPERTIES AND SYSTEM SIMILARITIES MAKE HC's BEST ALTERNATIVE TO HFC's.**
- **RECOVERY OF REFRIGERANT NOT NECESSARY**
  Easier to service and dispose of at end-of-life
- **HC OFFERS 45-60% DECREASE IN CHARGE SIZE COMPARED TO R-134a/R-404A**
- **SAFE / PROVEN TECHNOLOGY USED AROUND THE WORLD**

natural refrigerant

R-290 Service Manual

WHY R-290

WHY IS R-290 THE BEST ALTERNATIVE

GLOBAL-WARMING POTENTIAL (GWP) is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

Refrigerant	GWP	ODP
R-404A	3922	0
R-134a	1340	0
R-290 Propane	3	0

*For Reference: Carbon Dioxide has a GWP of 1

R-290 Frequently asked Questions

natural refrigerant®

R-290 Service Manual

R-290 FAQ

MAKING YOUR WORLD COOLER®

What do I need to know
to service HC equipment?

1. **Do you need any specialized training to service R-290?**
   No. The EPA has ruled specialized training is not required but is recommended.

2. **Where do I go for training?**
   True Manufacturing recommends contacting Refrigeration Service Engineers Society to inquire about their training program. The e-mail address for this is www.rses.org.

3. **What tools are needed to service HC cabinets?**
   There are only two specialized tools that are required for servicing HC equipment. A combustible gas meter/R-290 leak detector and a safety placard.

   True has developed a HC service kit that includes the two specialized tools and other tools that we suggest be used.

Part# 991755

LMc | 6/2015

R-290 FAQ

R-290 Frequently asked questions

1. **Is there a maximum charge amount for commercial applications with R-290?**
   Yes. You can only have a maximum charge amount of 150 grams (5.3 ounces) in each refrigeration system. For example, GDM-10 has a charge amount of 1.9oz

2. **Are there special markings on a cabinet built using R-290? How will I be able to tell if the system I'm working on is built with R-290?**
   Yes. The indicators are:
   - *The serial number tag will indicate the type of refrigerant.*
   - *The unit will have multiple labels stating that it is built with an HC/R-290 refrigerant.*
   - *The unit will also have the process sleeves colored red.*

3. **Will I need different gauges to use with an R-290 system?**
   No. The 134a manifold set can be used. Due to the small system charge amounts we suggest the use of the shortest hoses possible. Twelve inch hoses are included in our service kit.

4. **Are there any specialized tools needed to service an R-290 refrigeration system?** *Yes. The two specialized tools are listed below.*

   a. A combustible gas meter/R-290 electronic leak detector. This is available through most HVAC supply houses. It is also available through True Parts. True Manufacturing Part Number 965087.

   b. A safety placard advising of no smoking or open flames.

   Standard refrigeration tools are still needed: Pinch Off Tool, Nitrogen, Vacuum Pump, Micron Gauge, Torches, Soap Bubbles, Manifold Set, and Tube Cutter.

5. **Does the R-290 refrigerant have to be recovered?**
   No. The EPA has ruled that an R-290 system can be vented into the atmosphere.

6. **How do you leak check an R-290 system?**
   For the most part you would leak check an R-290 system the same way you would a R-134a or R-404A system with a couple of exceptions. You can still use a bubble solution or an ultrasonic leak detector as well. We would also recommend using oxygen free dry nitrogen with a trace gas not exceeding 200PSI.
   -Exception #1 is you cannot use a halide leak detector on a R-290 system.
   -Exception #2 your electronic leak detector must be designed specifically for combustible gas.

7. **Where can I get R-290 refrigerant?**
   For use on True warranty repairs you can get this refrigerant directly from the True parts department. You can also source this refrigerant from an HVAC supply house or a company that sells gases and welding supplies.
   Note: If you are getting refrigerant somewhere besides True make sure you are purchasing refrigerant grade propane R-290.

8. **What is the difference between R-290 and standard propane that you can purchase from a hardware store?** *R-290 has a much higher purity level. This level is greater than 97.5%. R-290 has a low moisture content. Moisture will damage the refrigeration system and components. Also, there is no scent added to R-290 which is added to standard propane.*

9. **Can I retrofit any cabinet to HC/R-290 refrigeran**
   No the EPA has ruled that the retrofitting of any existing equipment is prohibited.

10. **Can the same parts be used to service a hydrocarbon cabinet that are used on a R-134a/R-404*A* cabinet?**
    Not necessarily. We suggest using OEM parts by specific model number. Parts used on hydrocarbon cabinets must have specific UL certification for non-sparking parts

True Technical Service
World Headquarters: O'Fallon, Missouri, USA
Service Department Hours of Operation
7:00-7:00 CST Monday-Thursday, 7:00-6:00 Friday, 8:00-12:00 Saturday
phone: **1-855-372-1368**
email: **service@truemfg.com**

May 16/2015

R-290 Service Manual

Is Special Labeling on Equipment Required?

YES

natural refrigerant®

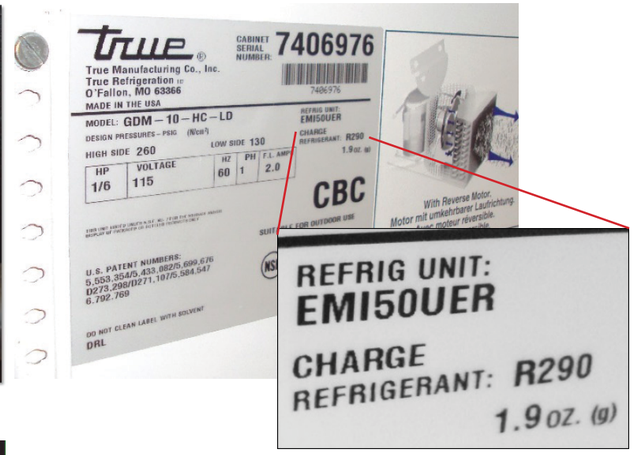
SPECIAL LABELING

HYDROCARBON LABELING | WHERE WILL THESE BE FOUND?

EXAMPLES

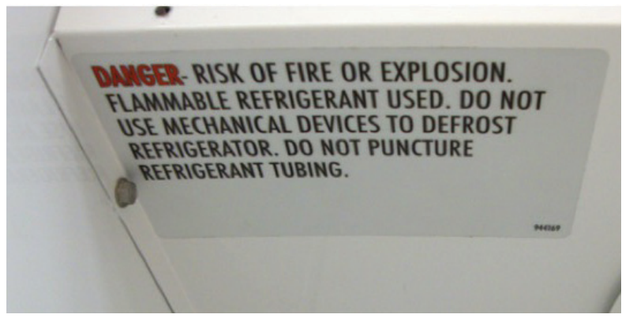
EXTERIOR BACK LEFT

INTERIOR SERIAL TAG



CAUTION- RISK OF FIRE OR EXPLOSION.
DISPOSE OF PROPERLY IN ACCORDANCE
WITH FEDERAL OR LOCAL REGULATIONS.
FLAMMABLE REFRIGERANT USED.
944173

EXTERIOR BACK RIGHT


DANGER- RISK OF FIRE OR EXPLOSION.
FLAMMABLE REFRIGERANT USED. DO NOT
USE MECHANICAL DEVICES TO DEFROST
REFRIGERATOR. DO NOT PUNCTURE
REFRIGERANT TUBING.

INTERIOR EVAPORATOR TOP/COVER

SPECIAL LABELING

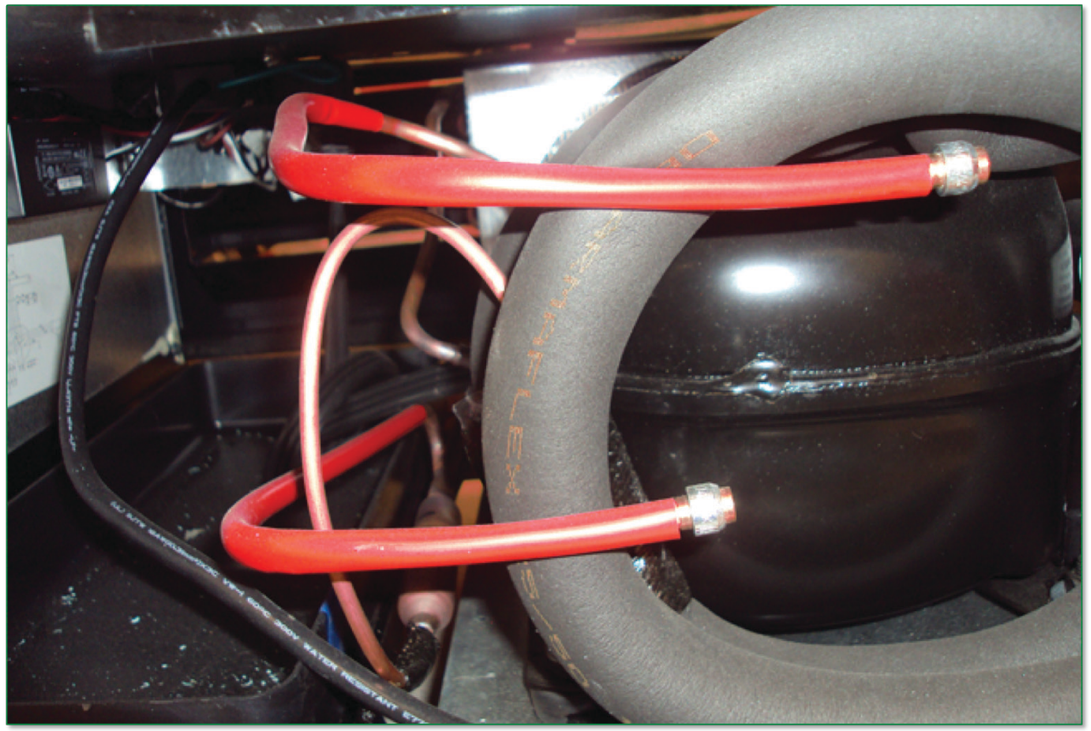
HYDROCARBON LABELING | WHERE WILL THESE BE FOUND?

COMPRESSOR

CAUTION
Use only approved refrigerants and lubricants and electrical components in the manner approved by Manufacturer. For details contact manufacturer. No manufacturer's release for use with flammable hydrocarbons. Any others may be dangerous, and could cause fires, explosions, or electrical shorting.
052-1899-02
08-07
WARNING
Service should be performed by trained personnel only. Failure to follow these safety warnings could result in serious injury or death.
ELECTRICAL SHOCK HAZARD.
Turn off power before servicing. Discharge all capacitors. Use this equipment in a grounded system only. System contains

SPECIAL LABELING

ALL PROCESS TUBES MUST HAVE PMS #185 RED SLEEVES



Red sleeves must always be reinstalled if removed during service

What's the Difference in R-290 vs. R-134a/R-404A

CABINET / COMPONENTS

NOTE: PARTS USED ON HC CABINETS MUST HAVE SPECIFIC UL CERTIFICATION FOR NON SPARKING COMPONENTS

natural refrigerant

ELECTRICAL SYSTEM

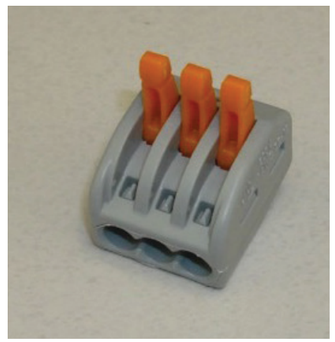
WIRE CONNECTORS

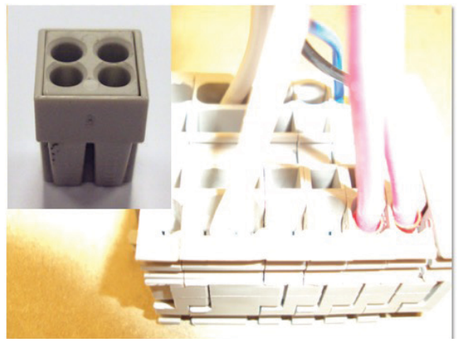
R-134a/R-404A

Wire Nut

Crimp Connector

R-290



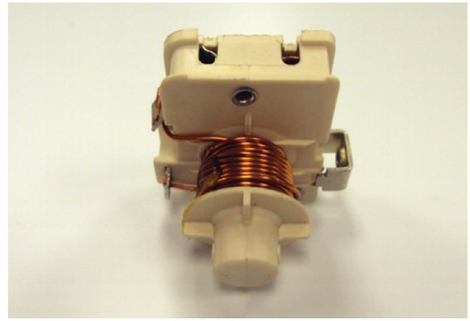


ELECTRICAL SYSTEM - SPARK FREE COMPONENTS

COMPRESSOR RELAY

R-134a/R-404A

R-290

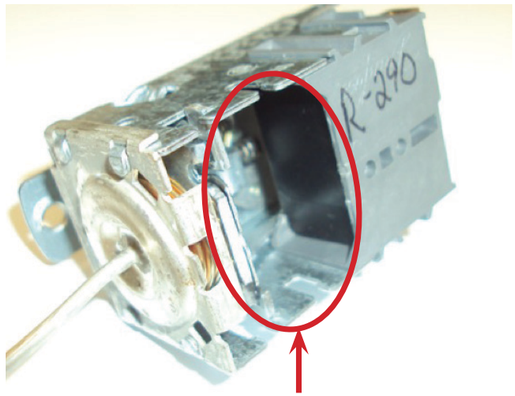


*** All covers should be in place**

ELECTRICAL SYSTEM - SPARK FREE COMPONENTS

TEMPERATURE CONTROL - R-290

Mechanical



* Contacts are enclosed

LAE Electronic Control

Danfoss Electronic Control

Sollatek Electronic Control

NOTE: PARTS USED ON HC CABINETS MUST HAVE SPECIFIC UL CERTIFICATION FOR NON SPARKING COMPONENTS

R-290 Service Manual

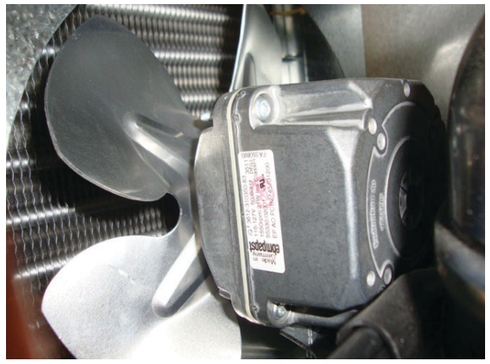
COMPONENTS

ELECTRICAL SYSTEM - SPARK FREE COMPONENTS

FAN MOTOR(S) - R-290 UL CERTIFICATION

All motors used by True pass the HC standards for non sparking components.

R-290



NOTE: PARTS USED ON HC CABINETS MUST HAVE SPECIFIC UL CERTIFICATION FOR NON SPARKING COMPONENTS

COMPONENTS

How Do I Know If the Parts I'm Using are HC/R-290 Compliant?

Order OEM parts through True's Parts Department:

1-800-424-8783

SNAP

IS SPECIALIZED TRAINING REQUIRED?

NO

Specialized training is recommended but not required for service providers.

For online training contact: www.rses.org

RSES®
The HVACR Training Authority
A non-profit educational association dedicated to providing opportunities for enhanced technical competence by offering comprehensive, cutting-edge education and certification to its members and the HVACR industry.

This certifies that

John Smith

has successfully completed

Hydrocarbon Refrigerants Certificate Course

Date awarded: September 06, 2012

Continuing Education Hours: 2

Chairman, Educational and Examining Board

What's the Difference in Servicing HC Systems

The processes used to service HC systems are very similar to current HFC systems(R-134a & R-404A)

natural refrigerant®

SAME PROCEDURES USED WITH ALL REFRIGERANTS INCLUDING HC/R-290

True® Manufacturing

BUILDING THE FINEST COMMERCIAL REFRIGERATION-TRUE, "The Best of the Cold Ones"

Good Refrigeration Practices

Good refrigeration practices will always start with good detective work to find out what caused the failure so we can eliminate the possibility of a repeat failure. Below is a step by step set of procedures we would recommend is followed when repairing a refrigeration system.

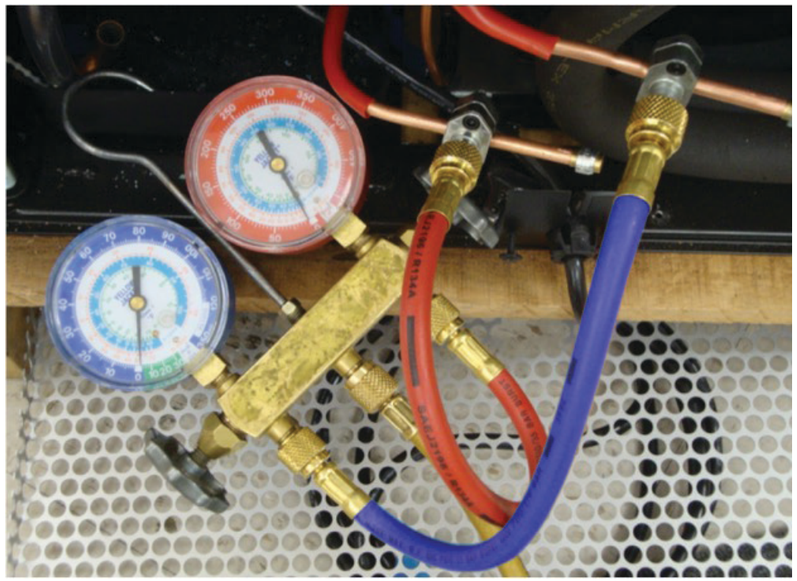
- Before opening the refrigeration system remember that POE oil is very hydroscopic and absorbs moisture very quickly. You should not leave the system open to the atmosphere for more that 15 minutes. Any vacuum that exists before any repair should be broken with nitrogen to avoid moisture being pulled into the system. **ALWAYS CHANGE THE DRIER WHENEVER THE REFRIGERATION SYSTEM HAS BEEN OPENED.**
- Recover the refrigerant from the system.
- The introduction to the refrigeration system of anything other than a flushing agent, nitrogen, refrigerant, or oil is prohibited.
- Remove the faulty refrigeration component and filter drier by cutting them out with a tubing cutter. (We would recommend this method over removing with a torch since it may destroy the evidence of what may have caused the failure or signs of oil contamination.)
- If you are changing a component keep the system closed up with plugs or caps to reduce moisture contamination.
- Take a look at the filter drier and the components that have been removed for signs of oil breakdown, foreign objects like desiccant from drier, metal pieces from valves, etc.
- When replacing a compressor make sure to also remove all old oil from the system.
- Be sure to pierce a hole (approx 1/8") in the bottom of the accumulator so we do not leave contaminated oil in the system. After blowing this out with nitrogen, be sure to braze the hole closed.
- Be sure and test the oil from the refrigeration system for contamination using the proper test kit for the type of oil.
- If the oil shows signs of contamination or there was a restriction in the system, all of the oil must be removed and replaced. This can be done by flushing the entire system with nitrogen, removing all the oil in the compressor, and in the accumulator, measure all of the old oil in a measuring cup and replace the exact amount you removed with the new oil.
- Now that the system has been cleaned up, install the new compressor. Please also remember that the system should not be opened more than 15 minutes.
- Now place a nitrogen charge in the system to check for any leaks. **Use maximum 200 PSI.**
- Release the nitrogen charge down to about 2 pounds of positive pressure.
- Start pulling a vacuum as soon as possible to help remove any moisture from the system. Remember that any moisture that is absorbed by the POE oil cannot be removed and we must start the process over.
- Change vacuum pump oil regularly to ensure the deepest vacuum your pump is capable of.
- Using a micron gauge, pull the system down to hold a minimum of 500 microns.
- See if the system will hold this micron with the gauges closed and the pump switched off to test for leaks or moisture.
- Once the system is evacuated, weigh in the proper charge as a liquid only on the high side of the refrigeration system.
- Test run the unit and check for proper operation.

ANY NITROGEN ADDED TO THE SYSTEM SHOULD NOT EXCEED 200 PSI.

SERVICING

SAMPLE OF GOOD REFRIGERATION PRACTICES

- Use the shortest hoses on your gauges as possible (because of smaller refrigerant charge).
- Bleed refrigerant back into system when removing line taps.



SAME PROCEDURES USED WITH ALL REFRIGERANTS INCLUDING HC/R-290

R-290 Service Manual

SERVICING

GOOD REFRIGERATION PRACTICES

Micron Gauge - Make sure to pull a 500 micron vacuum before doing service on a system.

SAME PROCEDURES USED WITH ALL REFRIGERANTS INCLUDING HC/R-290

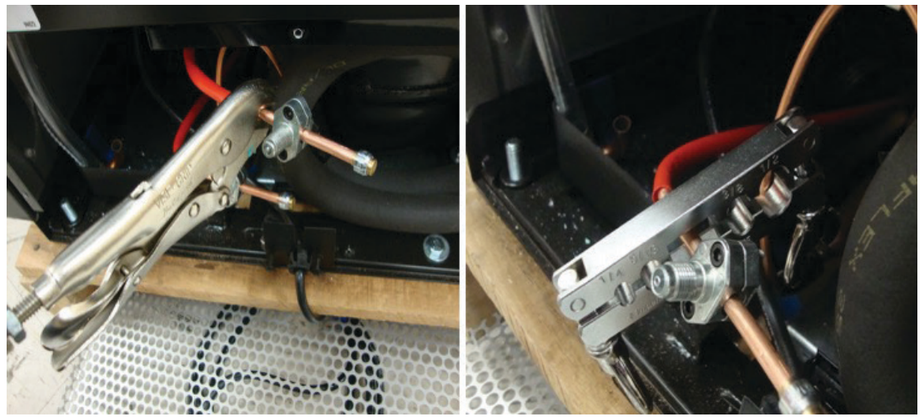
CHARGING THE SYSTEM

- Ensure that the system has been leak checked.
- Evacuate system to a minimum 500 micron.
- Weigh in the correct charge.
- Leak check the system again.
- Bleed the refrigerant from the high side hose to the low side hose.
- Carefully disconnect the hoses, to limit the refrigerant loss.
- Remove line taps.

R-290 Service Manual
SERVICING

SEALING THE SYSTEM

We recommend removing line taps from the system. Use a pinch off tool prior to sealing the ends of the process tubes. Thoroughly leak check process tube ends before brazing.



GOOD REFRIGERATION PRACTICES

BRAZING PROCEDURES

- Using oxygen free dry nitrogen set pressure to 3-5 PSI & purge for 2 minutes prior to brazing. Continue purging nitrogen through system until all brazing is complete.

CAUTION: RISK OF FIRE OR EXPLOSION. DISPOSE OF PROPERLY IN ACCORDANCE WITH FEDERAL OR LOCAL REGULATIONS. FLAMMABLE REFRIGERANT USED.
NON-FLAMMABLE GAS

Procedure required for servicing R-290 equipment.

WHY IS PURGING W/ NITROGEN REQUIRED?

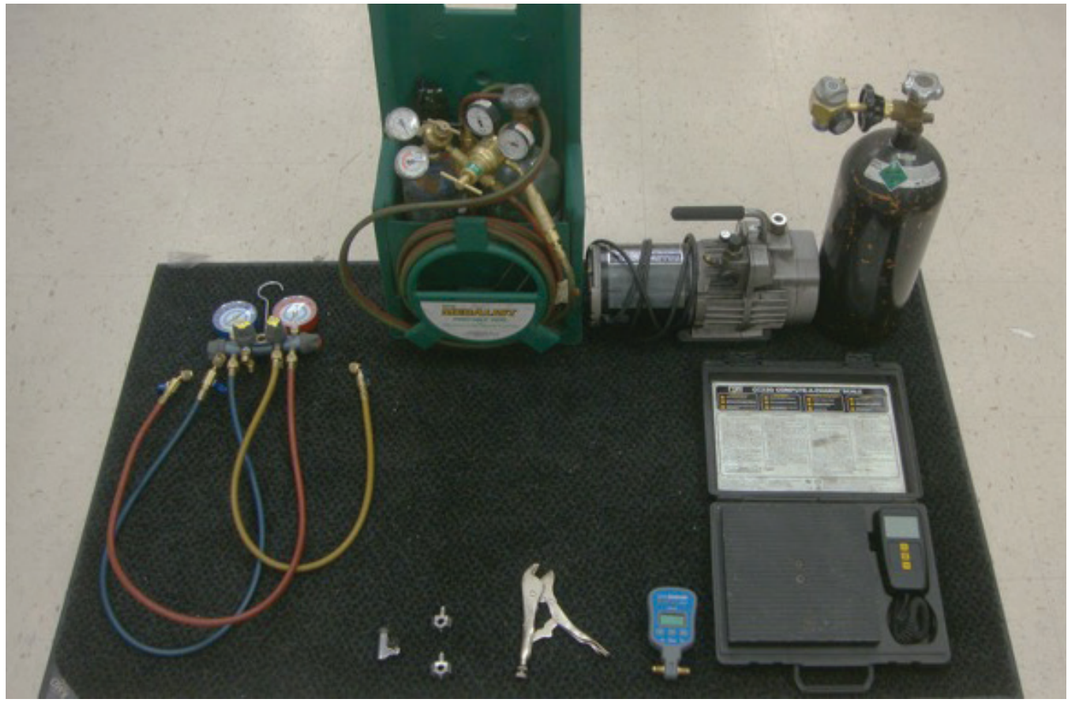
- To displace any trapped refrigerant in the system.

R-290 Service Manual

What's the Difference in the tools used?

natural refrigerant

TOOLS USED FOR ALL SYSTEMS INCLUDING HC/R-290



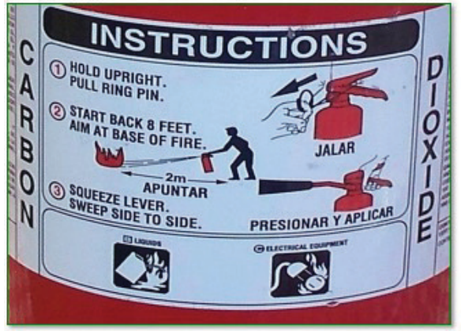
1. Torches
2. Manifold set
3. Vaccuum pump
4. Oxygen free dry nitrogen
5. Scale
6. Micron guage
7. Pinch off tool
8. Temporary line taps
9. Tubing Cutter

R-290 Service Manual
TOOLS
TOOLS USED FOR ALL SYSTEMS INCLUDING HC/R-290

GENERAL PRECAUTIONS

- All appropriate and necessary tools and equipment are available to include a CO^2 or dry-power type fire extinguisher.

This procedure needs to be followed when working on any system.

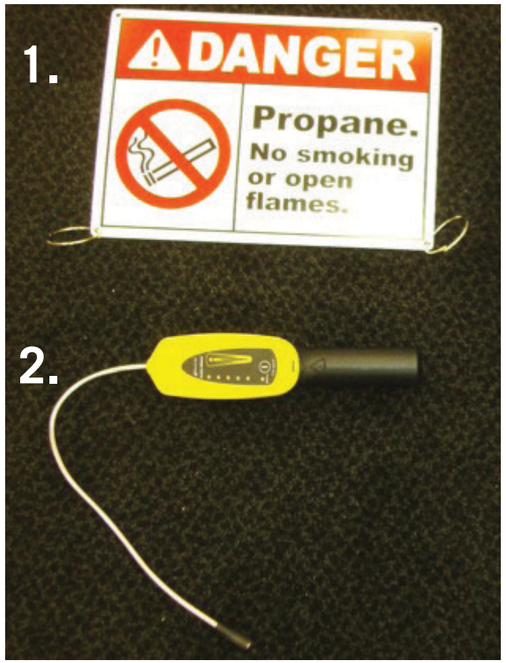


TOOLS NO LONGER NEEDED FOR R-134a/R-404A SYSTEMS

R-134a reclaiming system

NOTE: HC VENTING APPROVED BY EPA

TOOLS USED SPECIFICALLY FOR R-290 SYSTEM



1. Safety Plackard
2. Combustible Gas Meter
   Inficon Gas Mate
   Model 718-202-GI
   (True Part# 965087)

R-290 TOOLS

natural refrigerant

R-290 SERVICE KIT

KIT #991755

KIT INCLUDED

1. COMBUSTIBLE GAS METER
   - Inficon Gas Mate
   - Model 718-202-GI
   - (True Part# 965087)
2. Safety Plackard
3. Pinch off tool
4. 12” Refrigeration hose

FOR KIT CONTACT TRUE’S PARTS DEPARTMENT:
1-800-424-8783

For any other questions related to R-290, please contact True Technical Service

CONTACT:
Email: service@truemfg.com
Direct Line 855-372-1368

Hours of Operation:
Mon - Thurs 7:00 AM - 7:00 PM (CST)
Fri 7:00 AM - 6:00 PM (CST)
Sat 8:00 AM – 12:00 PM (CST)

NOTES

HYDROCARBON

ENERGY EFFICIENCY • PERFORMANCE • SAVINGS

True Technical Service
World Headquarters: O'Fallon, Missouri, USA Service Department Hours of Operation:
7:00-7:00 CST Monday-Thursday, 7:00-6:00 Friday, 8:00-12:00 Saturday
Phone: 1-855-372-1368 • Email: service@truemfg.com